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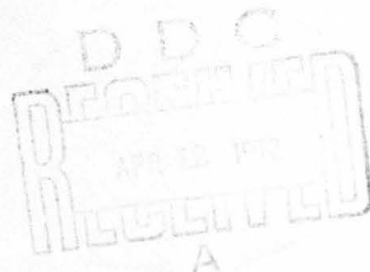
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13. ABSTRACT An olfactometer with appropriate programing and recording equipment has been assembled and threshold determinations made for several common odorous substances with values ranging from 0.1 to 0.3 percent by volume. At present the effect of behavioral baselines on threshold measures are under study. Analysis of masking agents on olfactory sensitivity is about to begin. Technical problems suggested changing from Landolt C's to Ronchi rulings for visual acuity measurements. Using Landolt C's the dogs appeared to come under stimulus control but exhibited unstable behavior. A number of auditory determination have been made. Stable thresholds for a tone of 1000 Hz are about 25 db re 0.0002 dynes x cm ⁻² . This baseline is stable and is used to assess masking effects of other auditory stimuli. Close liaison has been established between this research group, the Air Force Security Police and USAF School of Aerospace Medicine whereby basic principles developed through this research can be field applied to improve the capabilities of the Military Working Dog.			

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Initially, the experimental program examined the feasibility of using birds as pattern detecting components in automated machine systems. When it became apparent that it would take quite a long time to achieve operational capability in this area, the decision was made to shift the focus of research to studies directly relevant to extending the usefulness of the military working dog in stimulus detection and recognition tasks.

Work was therefore carried out (1) to create a dog laboratory for studies of sensory capacity; (2) to arrange adequate housing and maintenance facilities for the animals; and (3) to execute a series of pilot studies and replications of experiments done with other animal subjects as a necessary step on laying the groundwork for research to follow.

The program that followed consisted of (1) studies of basic sensory and discriminative capacity; and (2) investigations of efficient training techniques for bringing these abilities under human control with a view to improving the efficiency of dogs in patrol, detection, and surveillance activities.

I. Sensory and discriminative abilities: In this area studies were made of auditory, visual, and olfactory acuity, with emphasis on the latter sense.

(1) Audition: A working space consisting of an Industrial Acoustics sound-insulating chamber as well as all of the necessary associated systems for automatic programming, stimulus presentation, and calibration were constructed, and behavioral procedures devised for determining the German Shepherd's thresholds for pure tones and

other auditory stimuli.

Stable thresholds were obtained in all six of the animals tested. Typical thresholds for a tone of 1000 Hz are about 25 db re 0.0002 dynes $\times \text{cm}^{-2}$ (or in SI units, $0.0002 \times 10^{-5} \text{N} \times \text{cm}^{-2}$). While this value probably does not represent the animals' "absolute" thresholds (the human value for this frequency is nominally 0 db) the baseline is stable and can be used to assess the effects of masking stimuli.

(2) Vision: After a number of variations of apparatus, procedures, and stimuli we believe we have found a combination of these parameters which will permit us to determine both minimum separable and vernier acuity.

(3) Olfaction: For these studies an olfactometer with appropriate programming and recording equipment has been assembled and threshold determinations made for several common odorous substances. Threshold values range from 0.1 to 0.3 percent by volume. A number of control studies has been made to eliminate the possibility that the subjects were using spurious cues deriving from air flow switching transients. At present, we are continuing thresholds, establishing stable behavioral baselines, and will then initiate an investigation of the effects of masking agents on olfactory sensitivity and the time course of recovery of normal function.

Work is also under way on an automated procedures for training dogs to search for, detect, and report odorous substances of military importance.

Professional Activities:

A. Papers presented at meetings.

1. American Psychological Association, Washington, D. C., Sept., 1969.

John Pokrzywinski and Joseph Sam: Behavioral contrast without response rate reduction.

2. Southeastern Psychological Association, New Orleans, 1969.

John Pokrzywinski, Fred Kladder, Richard W. Malott, and Marilyn K. Malott: Some effects of discrimination training on the Mueller-Iyer illusion in pigeons.

3. Eastern Psychological Association, Atlantic City, April, 1970.

John Gibbon and Robert Berryman: Contingency spaces and random controls in classical and instrumental conditioning.

Robert Berryman and Salomé Steinmetz Berryman: Stimulus functions in matching to sample.

Robert Berryman: The complex discriminated operant: A review. Invited paper as part of the memorial symposium for W. W. Cumming.

4. Southeastern Psychological Association, Louisville, Ky., April, 1970.

John A. Bedford and William M. Smith: Water reinforcement in dogs.

John A. Bedford and Clinton McK. Bolton: Operant conditioning in the redtail hawk (Buteo jamaicensis).

Robert R. Haney: Response force emission on a fixed-interval schedule before and after a superimposed S^+ - S^- discrimination.

Robert R. Haney and John A. Bedford: Schedule effects in the whitenecked raven (Corvus cryptoleucus).

John Pokrzywinski and William P. Wilkes: Facilitating extinction by punishing precurrent operants.

John A. Bedford and T. Allen Smith: Color matching in the raven.

Stanley G. Smith: Acquisition of stimulus matching and the development of superstitious behavior using a split-key procedure.

5. Midwestern Psychological Association, Cincinnati, April, 1970.

John Pokrzywinski and Raymond Case: Suppression of an operant response by punishing precurrent behavior.

6. Southeastern Psychological Association, April 30, 1971, Miami, Fla.

Robert R. Haney and Robert Berryman: Locomotion and discrimination in dogs.

Papers published:

1. Haney, R. R., Bedford, J. A., and Berryman, R. Schedule control in the White-Necked Raven, Corvus cryptoleucus. Psychonomic Science, 1971 23, p. 104.
2. Pokrzywinski, J. Presence-absence discrimination training of a line-length dimension. Psychological Record, 1970, 20, 211-217.

Papers accepted for publication:

1. Berryman, Salomé S., and Berryman, R. Stimulus functions in matching to sample. In press, Journal of the Experimental Analysis of Behavior.
2. Haney, R. R. Response force distributions within a fixed-interval schedule. In press, Journal of the Experimental Analysis of Behavior.
3. Pokrzywinski, J. Discrimination in the chicken. In press, Psychonomic Science.

Papers submitted for publication:

1. Haney, R. R., and Berryman, R. Discrimination and attention in non-restrained dogs. Submitted to Psychonomic Science.
2. Gibbon, J., and Berryman, R. Contingency spaces in classical and instrumental conditioning. Submitted to Psychological Review.
3. Eckerman, P. A., Cumming, W. W., Berryman, R., and Lanson, R. N. The effect of sodium pentobarbital on symbolic matching and symbolic oddity performance. Submitted to Psychopharmacologia.
4. Bonin, L. F. R., and Berryman, R. A temporal conditional discrimination. Submitted to the Journal of the Experimental Analysis of Behavior.